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The Cure of Inguinal
Hernia in the Male.

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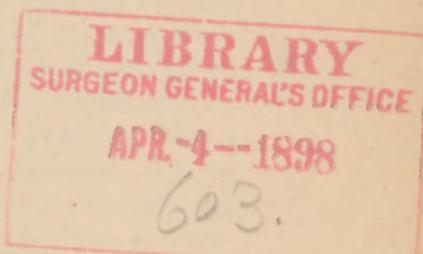
Read at the Forty-second Annual Meeting of the Ohio State
Medical Society, at Cleveland, Ohio, May 19, 1897.

By HENRY O. MARCY, A. M., M. D., LL. D.

Of Boston, U. S. A.

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THE CURE OF INGUINAL HERNIA IN THE MALE*

BY

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Mr. President: My thanks, sir, are due to you for your complimentary introduction, since I must confess that I accepted your invitation to deliver the annual address upon surgery with more than usual pleasure. This in part because the subject was of your selection, and presumably grew out of an early correspondence upon hernia and the knowledge of your own wide experience as an operator, you being among the first, if not the first of the surgeons of Ohio to effect the cure of hernia in the male.

Another and a personal reason is the fact, that the larger share of my family have been citizens of Ohio, my grandfather, Thomas Marcy, having been one of the early settlers of the Western Reserve, having made eighteen round journeys from Massachusetts with his four-horse canvass-covered wagon in the enthusiastic settlement of the town of Freedom, Portage county.

Therefore, accept the congratulations of a foster son upon the high position which the members of the medical profession of Ohio have taken, not alone in the councils of our nation, but also in the great brotherhood of the profession.

We limit the subject of our discussion this evening to the cure of hernia in the male, since this is confessedly by far the more difficult variety of hernia in which to effect a cure, because, no matter what means are employed, it is essential that we permit the passage of the uninjured cord

* Illustrated by stereoptican views.

through the abdominal wall. The student of the history of surgery finds that the surgeon of an earlier period made comparatively easy the permanent cure of hernia, by the sacrifice of the testicle and the permanent removal of the *vas deferens* with its attendant vessels, but in that period of surgical development an uninfected wound was a rare accident, and the suppurative processes, incident to wound repair, made the plastic reconstruction of the abdominal wall an impossibility.

It was reserved as one of the triumphs of antiseptic surgery to make possible the cure of hernia in the male by the reconstruction of the parts to their normal condition.

To this end certain factors are necessary. First, an open and free dissection of the parts, the wound made and maintained aseptic.

Second, the reconstruction of the inguinal canal to its normal obliquity and the re-enforcement of its posterior wall, in order that the intra-abdominal pressure may be brought to bear upon it in a way to coaptate and close its walls, instead of acting as a wedge to dilate the canal by the escape of a portion of the abdominal contents through it.

For the making and maintaining of a wound in an aseptic condition, surgery will be indebted for all time to the immortal Lister, and I take much pleasure in expressing my special indebtedness to the great master, as his first American pupil. Based upon his demonstrations that arteries might be ligated in continuity with sterilized cat-gut, it seemed to me a reasonable corollary that undivulcitated tissues might be safely coaptated by the use of buried sutures, to be left undisturbed in closed wounds, and this has been my contribution to surgery. These were first used for the purpose of affecting the cure of hernia and published by me in 1870.

The methods best adopted for this purpose will be referred to later, and since all good surgery is necessarily based upon an intimate knowledge of the anatomy of the parts with

which the surgeon has to deal, I shall now call your attention to the photographic reproductions upon the screen of as large a number of the splendid demonstrations of the great masters of a former generation as the time at my disposal will permit. In passing, I would emphasize that very exceptional piece of bookmaking at the beginning of our century, Sir Astley Cooper's work upon Hernia, his expenditure upon the illustrations of which alone cost five thousand pounds sterling.

The excellent artistic perfection of the illustrations in Scarpa's great work upon Hernia, first published in 1812, is even superior to that of the great London surgeon, while Bourgery's surgical atlas is likely long to maintain supremacy, since the original drawings were, not alone like its predecessors, produced by great artists, but each one of his plates were carefully and painstakingly colored by hand. This extraordinary work was published at twenty-five hundred francs per copy, and to-day is obtained only with the greatest of difficulty.

I take pleasure in expressing my thanks to Mr. Appleton of D. Appleton & Co., publishers, for his generosity, which has made possible the faithful reproduction of these and many other valuable plates, and for placing the same at comparatively small cost at the service of the surgeon of to-day.

I think you will agree with me that the analytical examination of these plates demonstrates the fact, that singularly enough, has scarcely been pointed out by any, that the inguinal canal traverses the abdominal wall in a direction so oblique that the intra-abdominal pressure is exerted at nearly a right angle to its axis, and that in its normal development, the greater the intra-abdominal pressure produced by the most violent exertion, the more closely is the canal closed upon itself by the lateral compression of its walls. This will be readily observed by the study of athletes in the performance of their extraordinary feats of

muscular exertion, where the abdominal muscles are actively brought into use.

My attention was first directed to it by the study of the valvular closure of the ureter at its entrance into the bladder. The obliquity of its passage through the bladder-wall being such that the more distended the viscus, the more firmly is the canal closed in order to prevent the reflux of the urine.

✓ We are indebted to Sir Astley Cooper for having pointed out that normally there exists a very decided reenforcement, or thickening of the *transversalis fascia*, which is the chief element of strength in the posterior wall of the inguinal canal. This, normally, should continue quite up to or beyond the internal ring, the opening of which is strengthened by bands of circular fibers. Sometimes muscular *fasciculi* of the *transversalis* extend below the internal ring and when this takes place it might be said that the internal ring of the canal is formed by an opening through the *transversalis* muscle. These muscular fibers are unimportant except as a study of the developmental processes, but the exceptional thickening of the connective tissue which normally pertains is the especial reason why the obliquity of the canal is maintained. This has been called the *fascia Cooperi* in honor of the great surgeon. ✓

I have shown you the magnificent illustrations of W. Darrach, M. D., published in Philadelphia in 1830. He was an enthusiastic pupil of Cooper and made his dissections and measurement after the methods of this great master. You will also note that the fine dissections of Blondin clearly demonstrate the oblique course of the canal without any hint whatever of its physiologic importance.

In this connection I invite your attention to the plates of Cloquet, who is said to have made five hundred dissections of hernial subjects. From him we have the naming of the structures about the internal ring as seen from within, called the *infundibular* process. This is designated as

normal anatomy, but, in reality, no such process exists in the normal development and can only be made so to appear by pulling upon the cord, when a depression will take place from undue tension of the lower border of the internal ring. In the normal condition the connective tissue attachment of the cord to the internal ring and peritoneum is such as to permit an easy play of the cord through the ring, and, when this alone exists, the peritoneum presents a smooth, even surface without depression over the site of the internal ring. But here it will be remembered the constituents of the cord which passes from the testicle to the internal ring separate at a wide angle, the *vas deferens* alone descending to the seminal vesicle at the base of the bladder.

By far the more common cause of inguinal hernia is found in the imperfect development of the structures making up the internal ring, and this consists almost entirely of a depression of the lower border of the ring and lack of resisting power in its posterior wall.

It is certainly impossible to produce an indirect inguinal hernia, following the line of the canal without there first having been a very decided weakening of the lower portion of the internal ring. When this has taken place, the intra-abdominal pressure commences to act as a wedge, and every special effort of the abdominal muscles produces a decided hydrostatic impulse which, little by little, opens still farther the inguinal canal. Although a sense of weakness and discomfort is often felt, as a rule, the subject does not appreciate his condition, until the external ring gives way as a result of some sudden muscular effort, and this has given to hernia the name of *rupture*, signifying a sudden yielding of the retaining structures.

I have presumed to occupy this much of the time in the emphasis of the normal conditions, since it is evident that, in the proper sense of the definition, the cure of hernia must be the restoration to, and maintainance of the structures in their normal condition, which I contend, means the-

reconstruction and reenforcement of the posterior wall of the inguinal canal as its first and most important factor. It is not, as many have accepted, simply making a new canal for the passage of the cord, or again reducing the same in size so that the cord may be permitted to escape through a smaller opening.

When this portion of the canal has been reconstructed, the remainder of the problem is reduced to simple terms, to wit, the closure of the external structures, after the cord has been replaced, and the reformation of the external ring.

Operators form the new canal in a variety of methods, and this constitutes in a large degree the hernia operations named after different surgeons. The custom of thus recognizing the value of the services of contributors to our art is most satisfactory and pleasing, especially so, since the only reward given to merit for such service is complimentary.

However, names are confusing unless the conditions indicated thereby are kept clearly in mind. I have, from the beginning, contended that, in normal anatomy, the surgeon will ever find his safest guide, and departures therefrom are defective and dangerous. One extreme of reconstruction, which may be considered the swing of the pendulum from early conservatism, is the forming of the internal ring as high up as possible and placing all the strong structures of the abdominal wall behind the cord, covering it in with only fatty tissues subjacent to the skin. This in effect makes a short, direct opening through the abdominal wall, so far as its important resisting structures are concerned. Without taking into consideration the impairment of the function of the testicle, owing to the unnatural relation of its efferent canal, a danger far more than hypothetical, there is left, as a result of the operative interference, an opening, more or less large, directly in line with the intra-abdominal pressure. This not seldom is the site of a recurrent direct hernia, the abdominal contents usually

escaping above the cord. I have several times operated for the cure of such a recurrent hernia.

In quite a number of the illustrations projected for our study, it is clearly demonstrated that the structures external to, and opposite the internal ring are of a very strong, unyielding character, made up as they are of the conjoined tendon and Poupart's ligament firmly united each to the other by the inter-columnar *fascia*. These structures buttress from without very firmly the internal ring and necessarily reflect the intra-abdominal force obliquely downward along the line of the canal. When the internal ring is of normal dimensions, the intra-abdominal pressure forces it against these strong unyielding structures and produces a firm valvular closing of the sides of the inguinal canal, and in the reconstruction of the structures for the cure of hernia, it is of the utmost importance that these parts are restored to their normal integrity.

I know that even the most accomplished surgeons present will pardon the emphasis which I have made in the foregoing analysis of the normal structures which make up the inguinal canal, the more so, especially since the surgical authorities have treated this part of the subject as of little importance.

In the discussion of the cure of hernia, naturally the first question which arises is, when to operate?

Early in my experience there were very few surgeons who gave their approval to my opinions and with emphasis declared that operative interference should be limited only to cases of strangulated hernia, and that here it might be permissible to institute measures for the cure of the hernia. Indeed, it was with great difficulty that I secured the presence of a physician to witness my first operation, in 1870, deliberately undertaken for the cure of a reducible hernia. Little by little, confidence grew in the safety of the new surgical measures, and it was deemed permissible to operate upon hernia, where the retention of the abdominal contents

was difficult or uncertain. When it was clearly demonstrated that the operative wound could be safely closed without drainage, and that the iodoform collodion seal was a protection from subsequent infection, the list was enlarged to make it advisable to operate upon children, until now a very considerable, although minor portion of the profession, deem it permissible, if not wise, to operate upon any of the great truss-bearing army of invalids who are otherwise in a fair condition of health.

My own experience has gradually produced the conviction that, as a rule, it becomes the duty of the competent surgeon to advise the larger number of hernial subjects to avail themselves of the present safe and almost certain means of cure.

First, because every man affected with hernia is liable at any time to a possible and immediate danger to his life. The strangulation of a loop of intestine, escaping through the inguinal canal has from time immemorial been considered as a condition of the greatest danger.

The statistics of our large hospitals show a greater mortality in this class of operations than in that of almost any other, not from the operation *per se* as was too often earlier supposed, but from the conditions which demand operative interference.

That this danger is a common one every practitioner present will testify from his own too abundant experience.

Statistics are now ample to show that the operation undertaken for the cure of hernia, when the abdominal contents are not involved, should be almost entirely devoid of danger.

In my own experience, now in my four hundredth series, I have not seen a case which seemed to approach the danger line where the intestine was not involved. In my recent work upon hernia, I have collected over three thousand operative cases, with a mortality of less than one per

cent., and even here the fatality is ascribed to other and accidental causes.

That hernia may be permanently cured the testimony of experience is now ample. My own statistics give a permanency of over ninety per cent., and some of these cases have been under observation for many years. That this widespread infirmity is owing to something more than accidental causes is adduced from the fact that in the United States alone there are estimated to be between three and four millions of sufferers from hernia. This great truss-bearing army of invalids appeal to our sympathy for aid, and it is in their interest especially that I plead with you to qualify yourselves to furnish the means of relief.

The details of the operation in a general way may be outlined as follows: It is taken for granted that this, as every other surgical operation must be conducted under the most careful modern aseptic precautions. The parts having been shaven and disinfected, the incision is made in the line of the canal and of sufficient length to permit of a free and easy manipulation of the parts involved. The cord is carefully separated from its attachments and carried toward the median line, where it is gently held as most convenient by an assistant. The hernial sac is opened, and its contents examined, and returned to the abdominal cavity. If adhesions have formed these are carefully separated. Not very rarely an omental mass, which has long been retained, constituting an unreducible hernia, is wisely removed. If so, its pedicle must be sutured across with much care. It is my usual custom to do this in two lines of double continuous suture. The advantage of this lies in the fact that the pedicle is subdivided into as many parts as may seem desirable, while a second line of suturing renders hemorrhage less liable and permits the occlusion of the vessels with less violence to the constricted structures. The importances of preserving the enclosed structures undevitalized is of the first importance although a strict asepsis has

been maintained. It is much wiser to return the incarcerated omentum, unless its deformation is very considerable, or that its many bleeding points cause it to be a source of troublesome hemorrhage.

In strangulated cases this condition of the incarcerated intestine may demand special operative measures, discussion of which cannot be entered upon at this time.

The sac, if of any considerable size, is to be dissected to its very base, and separated from its attachments quite within the ring. Tension is gently made upon it by an assistant, while it is sutured in the long axis of the wound, and then the sac is resected. The suture is greatly to be preferred to the ligature in that it closes the peritoneum in an even seam, without the possibility of slipping from the enclosing suture.

The elasticity of this peritoneum is quite sufficient to cause it to retract without depression. The structures which make up the posterior wall of the canal are now reformed by enclosing from side to side the attenuated *transversalis fascia*, until the sutures are carried from below upward as far as the judgment warrants, reforming the internal ring by coaptation of the tissues under the cord upon its posterior border. In large, old herniae these tissues are often so atrophied and weakened that it is wise to split the conjoined tendon and Poupart's ligament, enclosing their posterior portions to strengthen and reform the posterior wall of the canal. When this has been effected, the cord is replaced and the firm aponeurotic structures of the oblique muscle are carefully sutured from above downwards, the last stitches forming the external ring. A layer of skin sutures, also buried, completes the operation. The wound is thoroughly dried, the edges of the skin are carefully adjusted and held in apposition by a protective layer of iodoform collodion, reinforced by a few fibers of absorbent cotton.

It is many years since I have used drainage of any kind. The patient is kept in the recumbent position only so far as is necessary to give physiologic rest to the parts involved. This should be maintained for about three weeks. No truss is subsequently applied and light work is permitted at an early date, only insisting that the patient must be careful in exercise for a number of months, since I believe that the full resisting force of the structures returns very slowly.

In children it is the exception to remove the sac, often-times it is not necessary to open it, although I believe the rule is a good one in order to be sure that the sac is empty, and that is often ascertained only by an examination of the interior of the sac.

The suture material to be employed is important. For a considerable period I used sterilized cat-gut, then the tendons obtained from the deer, caribou, and moose, but since 1882 I have used exclusively the tendons taken from the tail of the Kangaroo. These latter furnish almost an ideal suture material, are strong, smooth, and even, and are obtained of any size which may be desired. They should be taken from the freshly-killed animal, quickly sun-dried and kept dry until prepared for use. In this way they have never been subjected to processes of decomposition and, as a consequent are not likely to have been invaded by bacteria.

Their preparation consists in soaking them in a 1-1000 solution of bichloride of mercury until softened, so as to be easily manipulated, separated, and selected. They are then dried on an aseptic towel, soaked in a solution of formal, after which they are chromicised (a sort of tanning process for the fixation of the cement substance), and are ready for use. Like cat-gut they may be preserved in a very considerable variety of media: bichloride alcohol, boiled in alcohol or kummel. However, these processes injure the structure of the tendon materially and, on this account, I still prefer the boiled linseed oil and carbolic acid, as first

recommended by Lord Lister. When preserved in this, excluded from the air to prevent the oil drying upon the tendons, the suture material improves with age and I prefer not to use the tendon until it has been six months thus preserved. The carbolic oil is not a germicide and should be kept carefully closed from any source of infection. Wet tendons must not be put in the oil, but carefully dried first covered in an aseptic towel, since the water forms an emulsion with the oil which will soon soften and ruin them. In preparation for an operation the tendon is transferred from the oil to a warm solution of 1-1000 bichloride of mercury, in which it is to remain for half an hour before using. In this way it becomes supple and is applied more easily. When first taken from the oil it is much too hard and stiff for easy manipulation. Cat-gut is the connective tissue sheath of the intestine of the sheep, and no matter how prepared it is necessarily defective from its inherent construction.

While I would again emphasize that the one object to be attained in the cure of hernia is the reconstruction and reinforcement of the inguinal canal to its normal obliquity, the especial means by which this is effected may vary greatly and yet the results be satisfactory. Silk, silk-worm gut, silver wire, cat-gut, all may be used as suture material, and may be applied by various methods, and the inclosing structures may vary in a considerable degree, and yet the resultant cure be effected. I believe in the use of as few and simple instruments as possible, and consequently have added to the list only with reluctance.

The advantage, however, is considerable in the use of a needle with the eye near the point by which the suture is introduced under the parts to be enclosed. It is threaded, carried through the parts, unthreaded, rethreaded with the opposite end and withdrawn. In this manner, a double, or two lines of continuous suturing are applied, quite after

the way in which the shoemaker sews with awl and waxed end.

It is to be remembered, however, that coaptation and not constriction is sought with a minimum of violence to the sutured structures. With an Hagedorn needle the tissues may be coapted by introducing the needle from side to side, parallel to the long axis of the wound, each stitch entering directly opposite the emergence of the preceding one. In this way the tissues are neatly intrafolded and held in even coaptation. With ease and rapidity the reconstruction of the parts to their normal condition is effected. With a very fine suture, the stitches being taken through the deeper layer of the skin only, the edges are coapted by a buried suture without wavy lines or puckering.

The collodion seal renders subsequent infection impossible and aids in a measure in holding the structures in a state of physiologic rest. The addition of iododoform in solution is of value in its inhibiting power upon the developments of the *M. pyogenes albus*. Bandages of any sort are worse than useless.

Little by little the buried animal suture is encapsulated by leucocytes and invaded by them. These in turn are transposed into connective-tissue cells and *pari passu*, as the suture is absorbed, a living band of connective tissue is formed. This process may extend over a period of from four to six months.

In closing let me thank you for the attention which you have given me. A subject of such importance and extent has necessarily been treated all too briefly with many omissions of important details. For the sake of brevity I have laid myself open to the criticism of being dogmatic. I have necessarily been obliged to omit entirely the history of operative measures, undertaken for the cure of hernia, which in itself is of exceptional interest and would compass an entire evening if briefly told.

During the last quarter of a century, with unwearied enthusiasm, I have endeavored to teach the lesson which to-night I have here presented. In many of its essentials more recently the credit has been given to Bassini of Italy, whose first operations were undertaken long after my repeated publications upon the subject. I am not without personal ambition and it is with the largest pleasure that I not alone invite criticism, but ask that whatever of merit has accrued to our art by my own unwearied labors may be accorded to American surgery.

